

DETAILED ACTION and Restriction

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C.

121:

- I. Claims 1-71, drawn to an MR compatible neurovascular volume RF birdcage coil array, classified in class 324, subclass 318.
- II. Claims 72-78, drawn to an interface for couplings coil array to an MR system, classified in class 324, subclass 322
- III. Claims 79-80, drawn to a housing of a MR compatible neurovascular array, classified in class 324 subclass 321.

.The inventions are distinct, each from the other because of the following reasons:

2. **Inventions I, II, and III** are directed to related MR RF coil structures, MR compatible computer interfaces, and MR system housings. The related inventions are distinct if: (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed I, II, and III (1) can each have a materially different design, mode of operation, function, or effect. (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants, Since MR coils structure, MR computer interfaces, and MR housings are separate inventive considerations. Furthermore, the inventions as claimed do not encompass overlapping subject matter and there is nothing of record to show them to be obvious variants.

3. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

Art Unit: 2831

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

4. **Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined** even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention.**

5. The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

6. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

7. Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the

Art Unit: 2831

inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

8. During a telephone conversation with **attorney James Stevenson** Reg. No. 38,755 on March 24th 2010 a provisional election was made **without traverse** to prosecute the invention of **Group I, claims 1-71**. Affirmation of this election must be made by applicant in replying to this Office action. **Claims 72-80** are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.
9. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

10. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

11. The information disclosure statement (IDS) submitted on **8/14/2006** is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement. The initialed and dated information disclosure statement (IDS) submitted on **8/14/2006** is attached to this Office action.

Drawings

12. The drawings are objected to because the lettering, numbering, the height and spacing of the reference numbers, does not comply with **37 CFR 1.84 see specifically subsections (L), (M) and (P(1))**. The examiner notes that black and white shading is not permitted. All letters/number in figures must be legible and have uniform ¼ of an inch height. (i.e. they need to be typed in a standard form.)

Art Unit: 2831

A) Specifically figures **2A, 2B, 2C, 2D, 3A, 4B, 4C, 5A, 5B, 6A, 6B, 7A-7D, 8A-8D, 9, 10A, 10B, 11, 12A, 12B, 13A, 13B, 15, 16, 17** and **31** require corrections

13. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

14. **Claim 15** is objected to because of the following informalities: .

A) **Claim 15** depends from claim C1, there is no claim C1. The examiner is treating this claim as if it depends from **claim 1**, Appropriate correction is required.

Claim Rejections - 35 USC § 112

15. The term "**electrically adjacent** " in each of applicant's independent claims is a relative term which renders the claim indefinite. The term "**electrically adjacent** " is not distinctly defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The applied prior art below of **Monski, Jr. et al.**, teaches applicant's

Art Unit: 2831

primary resonant structures, with overlapping and the use of two rod structures connecting the outer and inner rings. Because of the overlapping at least two different rods are shared with other primary resonant structures in the **Monski, Jr. et al** prior art of record, and because current flows and all of the rods, there is an electrical adjacent overlap. A more definitive explanation, providing a more defined location, with a more specific frame of reference, then simply “electrically adjacent” is needed. Additionally, because there is overlap in the applied prior art of record with respect to the **Monski, Jr. et al.**, references ***stating that one Rod is “shared between the primary resonant structures”*** is not enough to define the meets and bounds as it is currently listed within applicant Claims since a single rod may be found within more than one primary resonant structures.

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

17. **Claims 1-15, 17-29, 31-33, 35-50, 52-58, and 60-71 are** rejected under 35 U.S.C. 102(b) as being anticipated by **Srinivasan** US patent 5,664,568 issued September 9th 1997.

With respect to **Claim 1, Srinivasan '568** teaches and shows "A neurovascular array for use with a magnetic resonance (MR) system capable of parallel-imaging via a plurality of processing channels" [See figures 1, 2, 3, 9, and 10; the abstract, col. 3 line 51 through col. 10 line 67.] **Srinivasan '568** teaches and shows, "the neurovascular array comprising:(a) a head coil" (i.e. head coil birdcage assembly 42) "having: (I) a first electrically conductive ring, (II) a second electrically conductive ring, and (III) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith", [See figures 2 and 3, col. 6 line 49 through col. 10 line 67] "wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures: (A) constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing one of said rods with each of its neighboring primary resonant substructures** so that each of said primary resonant substructures is enabled to receive a magnetic resonance signal from tissue within a field of view thereof, and (B) providing a source impedance considerably higher than, and for creating a resonant circuit with, a load impedance to which said primary resonant substructure connects so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (ii) while simultaneously being at least partially decoupled from the other of said primary resonant substructures of said head coil;" [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67**]. "(b) an anterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **Srinivasan '568 abstract, anterior coil 44a** col. 6 line 49 through col. 10 line 67] "(c) a posterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal

Art Unit: 2831

from tissue within a field of view thereof;" [See **Srinivasan '568 abstract, posterior coil 44b** col. 6 line 49 through col. 10 line 67] "and (d) an interface for enabling said coil elements of said head coil, said anterior coil and said posterior coil to be selectively interconnected to the processing channels of the MR system so that the neurovascular array can be selectively operated in a plurality of modes." [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67**].

With respect to volume coil **Claim 21**, and the corresponding method claim for making the volume coil **Claim 71**, **Srinivasan '568** teaches and shows "A volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system, [See figures 1, 2, 3, 9, and 10; the abstract, col. 3 line 51 through col. 10 line 67.] **Srinivasan '568** teaches and shows, "the volume coil comprising: (a) a first electrically conductive ring;" [i.e. component 88a **Srinivasan '568** col. 7 lines 7-8], "(b) a second electrically conductive ring; [i.e. component 88b **Srinivasan '568** col. 7 lines 7-8], "(c) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;" [See the "legs of birdcage coil 42 in figures 3 and 2, col. 6 line 49 through col. 10 line 67] "wherein said rods and said first and said second rings are configured to produce a plurality of electrically-adjacent primary resonant substructures about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67**]. "while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures so that each of said primary resonant substructures is enabled to receive a magnetic resonance signal from tissue within a field of view thereof;" [See **Srinivasan '568 abstract, col. 4 lines 35-57; col. 6 line 32 through col. 10 line 67**] "and (d) each of said primary resonant substructures having a source impedance considerably higher than, and for

Art Unit: 2831

creating a resonant circuit with, a load impedance to which said primary resonant substructure connects so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (ii) while simultaneously being at least partially decoupled from the other of said primary resonant substructures of the volume coil. [See **Srinivasan '568 abstract, figures 1 through 10; table 1; col. 3 line 51 through col. 10 line 67**].

With respect to **Claim 39, Srinivasan '568** teaches and shows "A neurovascular array for use with a magnetic resonance (MR) system having a plurality of processing channels" [See figures 1, 2, 3, 9, and 10; the abstract, col. 3 line 51 through col. 10 line 67.] **Srinivasan '568** teaches and shows, "the neurovascular array comprising: (a) a head coil" (i.e. head coil birdcage assembly 42) "including: (I) a first electrically conductive ring;" [i.e. component 88a **Srinivasan '568** col. 7 lines 7-8], "(II) a second electrically conductive ring; [i.e. component 88b **Srinivasan '568** col. 7 lines 7-8], "and (II) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;" [See the "legs of birdcage coil 42 in figures 3 and 2, col. 6 line 49 through col. 10 line 67] "wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures** so that said primary resonant substructures are isolated from each other via **a preamplifier decoupling scheme and an offset tuning scheme**" [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67, table 1**]. "thereby enabling each of said primary resonant substructures (i) to receive a magnetic resonance signal from tissue within a field of view thereof and (ii) to be

Art Unit: 2831

operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures;" [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67, table 1**]. "(b) an anterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **Srinivasan '568 abstract, anterior coil 44a** col. 6 line 49 through col. 10 line 67] "(c) a posterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **Srinivasan '568 abstract, posterior coil 44b** col. 6 line 49 through col. 10 line 67] "and (d) an interface for enabling said coil elements of said head coil, said anterior coil and said posterior coil to be selectively interconnected to the processing channels of the MR system so that the neurovascular array can be selectively operated in a plurality of modes." [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67**].

With respect to **Claim 53**, and the corresponding method claim for making the volume coil **Claim 68**, **Srinivasan '568** teaches and shows "A volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system" [See figures 1, 2, 3, 9, and 10; the abstract, col. 3 line 51 through col. 10 line 67.] **Srinivasan '568** teaches and shows, "the volume coil comprising: (a) a first electrically conductive ring;" [i.e. component 88a **Srinivasan '568** col. 7 lines 7-8], "(b) a second electrically conductive ring; [i.e. component 88b **Srinivasan '568** col. 7 lines 7-8], "(c) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith; [See the "legs of birdcage coil 42 in figures 3 and 2, col. 6 line 49 through col. 10 line 67] "wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short

Art Unit: 2831

segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures** so that said primary resonant substructures are isolated from each other via a **preamplifier decoupling scheme and an offset tuning scheme**" [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67, table 1**]. "thereby enabling each of said primary resonant substructures (i) to receive a magnetic resonance signal from tissue within a field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures." [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67, table 1**].

With respect to **Claim 61, Srinivasan '568** teaches and shows "An array for use with a magnetic resonance (MR) system having a plurality of processing channels, the array comprising: (a) a volume coil including: (I) a first ring at one end of said volume coil, said first ring being electrically conductive; (II) a second ring at an other end of said volume coil, said second ring being electrically conductive; and (II) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith; wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures** so that said primary resonant substructures are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme thereby enabling each of said primary resonant substructures (i) to receive a magnetic resonance

Art Unit: 2831

signal from tissue within a field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures;" [See the same rejection reasons as those provided with respect to claim 53 above.] **Srinivasan '568** also teaches and shows "(b) a secondary coil" [See **Srinivasan '568 abstract, anterior coil 44a** col. 6 line 49 through col. 10 line 67] "having at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof; [See col. 6 line 49 through col. 10 line 67] "(c) a tertiary coil having at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **Srinivasan '568 abstract, posterior coil 44b** col. 6 line 49 through col. 10 line 67] "and (d) an interface for enabling said coil elements of said volume coil, said secondary coil and said tertiary coil to be selectively interconnected to the processing channels of the MR system so that the array can be selectively operated in a plurality of modes." [See **Srinivasan '568 abstract, figures 1 through 10; col. 3 line 51 through col. 10 line 67**].

With respect to **Claim 2**, corresponding **claim 40**, **Srinivasan '568** teaches and shows that "said plurality of modes includes a neurovascular phased array mode in which said interface enables: (a) each pair of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system;" [See **Srinivasan '568** col. 9 line 36 through col. 10 line 67; table 1; col. 6 lines 32-62; col. 3 line 52 through col. 4 line 67; in combination with figures 3, 9, and 10] "and (b) each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system." [See **Srinivasan '568** col. 9 line 36 through col. 10 line 67; table 1; col. 6 lines 32-62; col. 3 line 52 through col. 4 line 67; in combination with figures 3, 9, and 10] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 2, 40** and need not be reiterated.

With respect to **Claim 3**, corresponding **claim 41, Srinivasan '568** teaches and shows that "said head coil has eight of said coil elements and said anterior and said posterior coils each have two of said other coil elements" [See col. 10 lines 23-67], "for use with the MR system equipped with at least eight of the processing channels" [See col. 10 lines 23-67]. The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 3, 41** and need not be reiterated.

With respect to **Claim 4**, corresponding **claim 42, Srinivasan '568** teaches and shows that "said plurality of modes includes a high resolution brain mode in which said interface enables each of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system." [See table 1, col. 9 line 36 through col. 10 line 67; col. 6 lines 38-44; figures 3, 9, and 10] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 4, 42** and need not be reiterated.

With respect to **Claim 5**, corresponding **claim 43, Srinivasan '568** teaches and shows that "said plurality of modes includes a volume neck mode in which said interface enables each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system." [See table 1, col. 9 line 36 through col. 10 line 67; col. 6 lines 38-44; figures 3, 9, and 10] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 5, 43** and need not be reiterated.

With respect to **Claim 6**, corresponding **claim 44, Srinivasan '568** teaches and shows that "said plurality of modes includes a spectroscopy mode in which said interface enables all of said coil elements of said head coil to be interconnected with a single one of the processing channels of the MR system." [See table 1, col. 9 line 36 through col. 10 line 67; col. 6 lines 32-62; col. 4 lines 36-67 figures 3, 9, and 10] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 6, 44** and need not be reiterated.

With respect to **Claim 7**, corresponding **claim 45, Srinivasan '568** teaches and shows that "said interface is capable of enabling said neurovascular

Art Unit: 2831

array to be selectively operated in said plurality of modes when said coil elements of said head coil, said anterior coil and said posterior coil are greater in number than the processing channels of the MR system.” [See table 1, col. 9 line 36 through col. 10 line 67; especially col. 10 lines 23-67; col. 6 lines 32-62; col. 4 lines 36-67 figures 3, 9, and 10] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 7, 45** and need not be reiterated.

With respect to neurovascular array **Claim 8**, and corresponding volume coil **claim 22**, **Srinivasan '568** teaches and shows that "each of said primary resonant substructures as said source impedance includes an input resonant circuit for enabling said primary resonant substructure via a low impedance preamplifier as said load impedance to be (i) operatively couplable to one processing channel of the MR system and (ii) at least partially decoupled from the other of said primary resonant substructures.” [See col. 7 line 53 col. 9 line 34; col. 4 lines 2-67; and figures 3, 9, and 10; in combination with col. 9 line 35 through col. 10 line 67.] The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 8, and 22** and need not be reiterated.

With respect to neurovascular array **Claim 9**, and corresponding volume coil **claim 23**, **Srinivasan '568** teaches and shows that "said low impedance preamplifiers are provided as part of the neurovascular array” (i.e. **claim 9**) or “volume coil” (i.e. **claim 23**).” [See figures 3, 9, and 10; col. 10 lines 11-67] The same reasons for rejection which apply to **claims 1, 8, 21, 22** also apply to **claims 9, and 23** and need not be reiterated.

With respect to neurovascular array **Claim 10**, and corresponding volume coil **claim 24**, **Srinivasan '568** teaches and shows that "each of said low impedance preamplifiers is provided with one of the processing channels of the MR system.” [See figures 3, 9, and 10; col. 10 lines 11-67] The same reasons for rejection which apply to **claims 1, 8, 21, 22** also apply to **claims 10 and 24** and need not be reiterated.

With respect to neurovascular array **Claim 11**, and corresponding volume coil **claim 25**, **Srinivasan '568** teaches and shows that "each of said primary

Art Unit: 2831

resonant substructures has said input resonant circuit corresponding thereto located in one of said short segment of said second ring thereof and said short segment of said first ring thereof.” [See col. 3 line 51 through col. 10 line 67 in combination with figures 3, 5, 4, 4a, 4b, 6, 6a and 8c] The same reasons for rejection which apply to **claims 1, 8, 21, 22** also apply to **claims 11 and 25** and need not be reiterated.

With respect to neurovascular array corresponding **Claims 12, and 13** which respectively depend from **claims 1 and 8**, and corresponding volume coil **Claims 26, and 27** which respectively depend from **claims 21 and 22**, **Srinivasan '568** teaches and shows that "each of said primary resonant substructures further includes at least one of: (a) a tuning circuit in at least one of said rods thereof; (b) a tuning circuit in said short segment thereof of said first ring; and (c) a tuning circuit in said short segment thereof of said second ring; for enabling said head coil to be tuned according to an offset tuning scheme through which each of said primary resonant substructures is (i) further decoupled from the other of said primary resonant substructures and (ii) still enabled to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signal.” [See col. 3 line 51 through col. 10 line 67; figures 1 through 8c] The same reasons for rejection which apply to **claims 1, 8, 21, and 22**, also apply to corresponding **claims 12, 13; 26, and 27**; and need not be reiterated.

With respect to neurovascular array **Claim 14**, and corresponding volume coil **claim 29**, **Srinivasan '568** teaches and shows that in the alternative examples birdcage coil 140, or 150 of respectively figures 9 and 10 is used to uniform head/brain coverage in which “said second ring of said head coil” (i.e. either 142a, 142b, or 144 in figure 9; or 152a, 152b, 154a, or 154b of figure 10) “has a diameter that is smaller than that of said first ring” (i.e. **claim 29**) or “of said first ring of said head coil” (i.e. **claim 14**) [See components 140 or 150 of figures 9 and 10 respectively, See also col. 10 lines 23-67 where alternate embodiments and other geometries for the birdcage coil are disclosed; Additionally figure 2 also suggests this limitation the initial entry opening of figure

Art Unit: 2831

2 has different size diameter than the remainder of the coils structure]. The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 14, 29** and need not be reiterated.

With respect to corresponding neurovascular array **Claims 15, 50 which depend from claims 1 and 39 respectively**, and corresponding volume coil **claims 33, 58 which depend from claims 21 and 53 respectively**, Srinivasan '568 shows from figure 3 that "said plurality of electrically-adjacent primary resonant substructures of said head coil is eight in number, with each being generally deployed 45 degrees apart from its neighbor". [See figure 3, col. 10 lines 23-67.] The same reasons for rejection which apply to **claims 1, 21, 39, 53** also apply to **claims 15, 33, 50, 58** and need not be reiterated.

With respect to neurovascular array **Claim 17**, and corresponding volume coil **claim 35**, Srinivasan '568 shows from figure 3 that "said primary resonant substructures of said head coil (i.e. **claim 17**) or volume coil, (i.e. **claim 35**) are deployed generally symmetrically about the birdcage-like structure." [See figures 2-22.] The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 15, 35** and need not be reiterated.

With respect to neurovascular array **Claim 18**, and corresponding volume coil **claim 36**, Srinivasan '568 shows from figure 3 that "selected ones of said rods of said head coil are spaced at irregular distances from adjacent ones of said rods." [See figure 3 and the unevenly distributed rods connecting to the upper and lower connection nodes that start and then vanish.] The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 18, 36** and need not be reiterated.

With respect to corresponding neurovascular array **Claim 19, 52 which depend from claims 1 and 39 respectively**; corresponding volume coil **claims 37, 60 which depend from claims 21 and 53 respectively**, and corresponding array coil **claim 67**, Srinivasan '568 teaches and shows from figure 3 that "each of said rods includes a decoupling network therein for decoupling said head coil from a radio frequency transmit field of the MR system during a transmit cycle

Art Unit: 2831

thereof. [See col. 7 line 53 through col. 10 line 67; the abstract, col. 4 lines 2-67; and col. 6 lines 32-62] The same reasons for rejection which apply to **claims 1, 21, 39, 53, and 61** also apply to **claims 19, 37, 52, 60, and 67** and need not be reiterated.

With respect to neurovascular array **Claim 20**, and corresponding volume coil **claim 38**, **Srinivasan '568 teaches from the two different functions of the decoupling circuits that** “each of said decoupling networks includes an active decoupling circuit and a passive decoupling circuit” because high impedance shielding during transmission is an active decoupling and isolating flowing currents within the coil assembly generally is effectively passive decoupling. [See col. 7 line 53 through col. 10 line 67; especially col. 8 line 54 through col. 9 line 34.] The same reasons for rejection which apply to **claims 1, 19, 21, 37** also apply to **claims 20, 38** and need not be reiterated.

With respect to volume coil **claim 28**, **Srinivasan '568** shows from figure 3 that of claim 21 further including a combiner circuit for combining the magnetic resonance signal received by one of said primary resonant substructures with that received by at least one other of said primary resonant substructures and operatively coupling the magnetic resonance signals to one processing channel of the MR system.” [See figures 1, 3, 9, 10, col. 6 line 32 through col. 10 line 67] The same reasons for rejection which apply to **claims 21** also apply to **claim 28** and need not be reiterated.

With respect to volume coil **claim 31**, **Srinivasan '568** shows from figure 3 that “said second ring” (i.e. component 88b of **Srinivasan '568** col. 7 lines 7-8) “has a diameter that is equal to that of said first ring” (i.e. component 88a of **Srinivasan '568** col. 7 lines 7-8). The same reasons for rejection which apply to **claims 21** also apply to **claim 31** and need not be reiterated.

With respect to volume coil **claim 32**, **Srinivasan '568 teaches that** “said first and said second rings are one of circular and elliptical.” [See **Srinivasan '568** col. 10 lines 46-47] The same reasons for rejection which apply to **claims 21** also apply to **claim 33** and need not be reiterated.

With respect to neurovascular array **Claim 46**, corresponding volume coil **claim 54**, corresponding array **claim 64**, and the corresponding method **claim 69**, **Srinivasan '568** teaches and shows that "said preamplifier decoupling scheme involves each of said primary resonant substructures having an input resonant circuit in said short segment of second ring thereof for enabling said primary resonant substructure via a low impedance preamplifier to be (i) operatively couplable to one processing channel of the MR system and (ii) decoupled thereat from the other of said primary resonant substructures. [See col. 7 line 53 col. 9 line 34; col. 4 lines 2-67; and figures 3, 9, and 10; in combination with col. 9 line 35 through col. 10 line 67.] The same reasons for rejection which apply to **claims 39, 53, 61 and 68** also apply to **claims 46, 54, 64 and 69** and need not be reiterated.

With respect to neurovascular array **Claim 47**, corresponding volume coil **claim 55**, and corresponding array **claim 65**, **Srinivasan '568** teaches and shows that "said low impedance preamplifiers are provided as part of the neurovascular array" (i.e. **claim 47**) or the "volume coil" (i.e. **claim 55**), or the "array" (i.e. **claim 65**).". [See figures 3, 9, and 10; col. 10 lines 11-67] The same reasons for rejection which apply to **claims 39, 46, 53, 54, 61, and 64** also apply to **claims 47, 55, and 65** and need not be reiterated.

With respect to neurovascular array **Claim 48**, and corresponding volume coil **claim 56**, **Srinivasan '568** teaches and shows that "each of said low impedance preamplifiers is provided with one of the processing channels of the MR system." [See figures 3, 9, and 10; col. 10 lines 11-67] The same reasons for rejection which apply to **claims 39, 46; 53, 54** also apply to **claims 48 and 56** and need not be reiterated.

With respect to neurovascular array **Claim 49**, corresponding volume coil **claim 57**, corresponding array **claim 66**, and the corresponding method **claim 70**, **Srinivasan '568** teaches and shows that "said offset tuning scheme involves in each of said primary resonant substructures **at least one of**: (a) a tuning circuit in at least one of said rods thereof; (b) a tuning circuit in said short

Art Unit: 2831

segment thereof of said first ring; and (c) a tuning circuit in said short segment thereof of said second ring; for enabling each of said primary resonant substructures to be tuned so that signal current induced therein is effectively precluded from interfering with neighboring ones of said primary resonant substructures primarily via said first ring and said rods thereby enabling each of said primary resonant substructures (i) to be decoupled thereat from the other of said primary resonant substructures (ii) while maintaining the ability to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signal. .” [See col. 3 line 51 through col. 10 line 67; figures 1 through 8c] The same reasons for rejection which apply to **claims 39, 46; 53, 54; 61, 64; and 68, 69** also apply to corresponding **claims 49, 57, 66 and 70** and need not be reiterated.

With respect to array **Claim 62, Srinivasan '568** teaches and shows that “(a) said volume coil is intended for imaging of a head of a patient;” [See volume coil 42] “(b) said secondary coil is intended for imaging carotid structures on one side of a neck of the patient;” [See the aortic arch on a side of the neck col. 9 line 35 through col. 10 line 67] “and (c) said tertiary coil is intended for imaging carotid structures on an other side of the neck of the patient” [See the aortic arch on an other side of the neck, along with figures 1,2, 3, 9, and 10] and col. 9 line 35 through col. 10 line 67]. The same reasons for rejection which apply to **claims 53, 61** also apply to **claim 62** and need not be reiterated.

With respect to array **Claim 63, Srinivasan '568** teaches and shows that “(a) said secondary coil is intended for imaging a heart of a patient from an anterior perspective;” [See anterior coil 44a which images the aortic arch of the heart “from an anterior perspective” col. 6 line 49 through col. 10 line 67.] “and (b) said tertiary coil is intended for imaging the heart of the patient from a posterior perspective.” [See posterior coil 44b which images the aortic arch of the heart “from an posterior perspective” col. 6 line 49 through col. 10 line 67.] The same reasons for rejection which that apply to **claims 53, 61** also apply to **claim 63** and need not be reiterated.

18. **Claims 1-30, 32-62, and 63-71 are rejected under MONSKI, Jr. et al., 7,084,629** US patent **7,084,629** issued August 1, 2006 filed November 27, 2003 with an effective US priority date of November 27, 2002.

With respect to **Claim 1, MONSKI, Jr. et al., 7,084,629** teaches and shows "A neurovascular array for use with a magnetic resonance (MR) system capable of parallel-imaging via a plurality of processing channels" [See **figures 2a through 22 col. 1 lines 15-23.**] **MONSKI, Jr. et al., 7,084,629** teaches and shows, "the neurovascular array comprising:(a) a head coil" (i.e. head coil **birdcage assembly 1000**) "having: (I) a first electrically conductive ring, (II) a second electrically conductive ring, and (III) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith", [See **figures 2a through 22; col. 8 line 4 through col. 15 line 59**] "wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures: (A) constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures** so that each of said primary resonant substructures is enabled to receive a magnetic resonance signal from tissue within a field of view thereof, and (B) providing a source impedance considerably higher than, and for creating a resonant circuit with, a load impedance to which said primary resonant substructure connects so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (ii) while simultaneously being at least partially decoupled from the other of said primary resonant substructures of said head coil;" [See **MONSKI, Jr. et al., 7,084,629 figures 2A-2B, col. 8 line 4 through col. 15 line 59**]. "(b) an anterior coil having

Art Unit: 2831

in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **MONSKI, Jr. et al., 7,084,629 figure 8, col. 15 lines 40-44**] "(c) a posterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **MONSKI, Jr. et al., 7,084,629 figure 9, col. 15 lines 40-44**] "and (d) an interface for enabling said coil elements of said head coil, said anterior coil and said posterior coil to be selectively interconnected to the processing channels of the MR system so that the neurovascular array can be selectively operated in a plurality of modes." [See **MONSKI, Jr. et al., 7,084,629 Figures 1, 1b, and 1c in combination with figures 2a, 2b; col. 12 line 44 through col. 15 line 39**].

With respect to volume coil **Claim 21**, and the corresponding method claim for making the volume coil **Claim 71, MONSKI, Jr. et al., 7,084,629** teaches and shows "A volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system, [See **col. 1 lines 15-23; figures 2a, through 22.**] **MONSKI, Jr. et al., 7,084,629** teaches and shows, "the volume coil comprising: (a) a first electrically conductive ring;" [i.e. component **1101 MONSKI, Jr. et al., 7,084,629 col. 9 line 29 through col. 15 line 39 figures 2a through 22**], "(b) a second electrically conductive ring; [i.e. component **1102 MONSKI, Jr. et al., 7,084,629 col. 9 line 29 through col. 15 line 39 figures 2a through 22**], "(c) a plurality of rods (i.e. A→H) electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;" [See **col. 9 line 18 through col. 15 line 39 figures 2a through 22**] "wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its**

Art Unit: 2831

neighboring primary resonant substructures [See **MONSKI, Jr. et al., 7,084,629 figures 2A-2B, col. 8 line 4 through col. 15 line 59**]. “so that each of said primary resonant substructures is enabled to receive a magnetic resonance signal from tissue within a field of view thereof;” [See **MONSKI, Jr. et al., 7,084,629 figures 2A-2B, col. 8 line 4 through col. 15 line 59**]. and (d) each of said primary resonant substructures having a source impedance considerably higher than, and for creating a resonant circuit with, a load impedance to which said primary resonant substructure connects so as to enable said primary resonant substructure (i) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (ii) while simultaneously being at least partially decoupled from the other of said primary resonant substructures of the volume coil. [See **MONSKI, Jr. et al., 7,084,629 figures 2A-2B, col. 8 line 4 through col. 15 line 59**].

With respect to **Claim 39, MONSKI, Jr. et al., 7,084,629** teaches and shows “A neurovascular array for use with a magnetic resonance (MR) system having a plurality of processing channels” [See **col. 9 line 18 through col. 15 line 39 figures 2a through 22**]. **MONSKI, Jr. et al., 7,084,629** teaches and shows, “the neurovascular array comprising: (a) a head coil” (i.e. **1000**) “including: (I) a first electrically conductive ring;” [i.e. component **1101 MONSKI, Jr. et al., 7,084,629 figures 2a-22**], “(II) a second electrically conductive ring; [i.e. component **1102 MONSKI, Jr. et al., 7,084,629 figures 2a-22**], “and (II) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith;” [See **col. 8 line 4 through col. 15 line 59**] “wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having**

Art Unit: 2831

within its structural makeup) one of said rods with each of its neighboring primary resonant substructures so that said primary resonant substructures are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme” [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**]. “thereby enabling each of said primary resonant substructures (i) to receive a magnetic resonance signal from tissue within a field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures;” [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**]. “(b) an anterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;” [See **MONSKI, Jr. et al., 7,084,629 figure 8, col. 15 lines 40-44**] “(c) a posterior coil having in proximity to said head coil at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;” [See **MONSKI, Jr. et al., 7,084,629 figure 9, col. 15 lines 40-44**] “and (d) an interface for enabling said coil elements of said head coil, said anterior coil and said posterior coil to be selectively interconnected to the processing channels of the MR system so that the neurovascular array can be selectively operated in a plurality of modes.” [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**].

With respect to **Claim 53**, and the corresponding method claim for making the volume coil **Claim 68**, **MONSKI, Jr. et al., 7,084,629** teaches and shows “A volume coil for use with a parallel-imaging compatible magnetic resonance (MR) system” [See coil 1000.] **MONSKI, Jr. et al., 7,084,629** teaches and shows, “the volume coil comprising: (a) a first electrically conductive ring;” [i.e. component 1101 **MONSKI, Jr. et al., 7,084,629**], “(b) a second electrically conductive ring; [i.e. component 1102], “(c) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith; [See figures 2a-22 and the abstract.] “wherein said rods and said first and said second rings

Art Unit: 2831

are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures** so that said primary resonant substructures are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme" [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**] "thereby enabling each of said primary resonant substructures (i) to receive a magnetic resonance signal from tissue within a field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures." [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**]

With respect to **Claim 61, MONSKI, Jr. et al., 7,084,629** teaches and shows "An array for use with a magnetic resonance (MR) system having a plurality of processing channels, the array comprising: (a) a volume coil including: (I) a first ring at one end of said volume coil, said first ring being electrically conductive; (II) a second ring at an other end of said volume coil, said second ring being electrically conductive; and (II) a plurality of rods electrically interconnecting said first and said second rings to form a birdcage-like structure therewith; wherein said rods and said first and said second rings are configured to produce a plurality of **electrically-adjacent primary resonant substructures** about the birdcage-like structure, with each of said primary resonant substructures constituting a coil element including two of said rods neighboring each other and a corresponding short segment of each of said first and said second rings interconnecting them, **while electrically sharing (i.e. having within its structural makeup) one of said rods with each of its neighboring primary resonant substructures** so that said primary resonant substructures

Art Unit: 2831

are isolated from each other via a preamplifier decoupling scheme and an offset tuning scheme thereby enabling each of said primary resonant substructures (i) to receive a magnetic resonance signal from tissue within a field of view thereof and (ii) to be operatively couplable to one processing channel of the MR system for conveyance of the magnetic resonance signal received thereby (iii) while being simultaneously decoupled from the other of said primary resonant substructures;" [See the same rejection reasons as those provided with respect to claim 53 above.] **MONSKI, Jr. et al., 7,084,629** also teaches and shows "(b) a secondary coil" [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59; figures 1-22**] "having at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof; [See **col. 8 line 4 through col. 15 line 59**] "(c) a tertiary coil having at least one other coil element for receiving a magnetic resonance signal from tissue within a field of view thereof;" [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**] "and (d) an interface for enabling said coil elements of said volume coil, said secondary coil and said tertiary coil to be selectively interconnected to the processing channels of the MR system so that the array can be selectively operated in a plurality of modes." [See **MONSKI, Jr. et al., 7,084,629 col. 8 line 4 through col. 15 line 59**]

With respect to **Claim 2**, corresponding **claim 40, MONSKI, Jr. et al., 7,084,629** teaches and shows that "said plurality of modes includes a neurovascular phased array mode in which said interface enables: (a) each pair of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system;" [See **MONSKI, Jr. et al., 7,084,629 col. 12 line 44 through col. 15 line 59**] "and (b) each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system." [See **MONSKI, Jr. et al., 7,084,629 col. 15 lines 29-39**] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 2, 40** and need not be reiterated.

With respect to **Claim 3**, corresponding **claim 41, MONSKI, Jr. et al.,**

Art Unit: 2831

7,084,629 teaches and shows that "said head coil has eight of said coil elements and said anterior and said posterior coils each have two of said other coil elements" [See **Figures 2a, 2b, 7**], "for use with the MR system equipped with at least eight of the processing channels" [See col. 6 lines 16-23, col. 15 lines 29-39]. The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 3, 41** and need not be reiterated.

With respect to **Claim 4**, corresponding **claim 42, MONSKI, Jr. et al.**, **7,084,629** teaches and shows that "said plurality of modes includes a high resolution brain mode in which said interface enables each of said coil elements of said head coil to be interconnected with a separate one of the processing channels of the MR system." [See **col. 11 line 38 through col. 15 line 59**] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 4, 42** and need not be reiterated.

With respect to **Claim 5**, corresponding **claim 43, MONSKI, Jr. et al.**, **7,084,629** teaches and shows that "said plurality of modes includes a volume neck mode in which said interface enables each of said other coil elements of said anterior and said posterior coils to be interconnected with a separate one of the processing channels of the MR system." [See **figure 8, figures 12-22, and col. 9 lines 18 through col. 15 line 59**] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 5, 43** and need not be reiterated.

With respect to **Claim 6**, corresponding **claim 44, MONSKI, Jr. et al.**, **7,084,629** teaches and shows that "said plurality of modes includes a spectroscopy mode in which said interface enables all of said coil elements of said head coil to be interconnected with a single one of the processing channels of the MR system." [See **col. 9 lines 18-28**] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 6, 44** and need not be reiterated.

With respect to **Claim 7**, corresponding **claim 45, MONSKI, Jr. et al.**, **7,084,629** teaches and shows that "said interface is capable of enabling said neurovascular array to be selectively operated in said plurality of modes when

Art Unit: 2831

said coil elements of said head coil, said anterior coil and said posterior coil are greater in number than the processing channels of the MR system.” [See **col. 15 lines 29-39** where multiple operational modes and configurations for connecting and arranging the ports and channels are taught.] The same reasons for rejection which apply to **claims 1, 39** also apply to **claims 7, 45** and need not be reiterated.

With respect to neurovascular array **Claim 8**, and corresponding volume coil **claim 22**, **MONSKI, Jr. et al., 7,084,629** teaches and shows that "each of said primary resonant substructures as said source impedance includes an input resonant circuit for enabling said primary resonant substructure via a low impedance preamplifier as said load impedance to be (i) operatively couplable to one processing channel of the MR system and (ii) at least partially decoupled from the other of said primary resonant substructures.” [See **col. 10 line 49 through col. 15 line 39, figures 2a, 2b, and 8, 9**] The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 8, and 22** and need not be reiterated.

With respect to neurovascular array **Claim 9**, and corresponding volume coil **claim 23**, **MONSKI, Jr. et al., 7,084,629** teaches and shows that "said low impedance preamplifiers are provided as part of the neurovascular array" (i.e. **claim 9**) or "volume coil" (i.e. **claim 23**).” [See **col. 10 line 49 through col. 15 line 39, figures 2a, 2b, and 8, 9**] The same reasons for rejection which apply to **claims 1, 8, 21, 22** also apply to **claims 9, and 23** and need not be reiterated.

With respect to neurovascular array **Claim 10**, and corresponding volume coil **claim 24**, **MONSKI, Jr. et al., 7,084,629** teaches and shows that "each of said low impedance preamplifiers is provided with one of the processing channels of the MR system.” [See **col. 10 line 49 through col. 15 line 39, figures 2a, 2b, and 8, 9**] The same reasons for rejection which apply to **claims 1, 8, 21, 22** also apply to **claims 10 and 24** and need not be reiterated.

With respect to neurovascular array **Claim 11**, and corresponding volume coil **claim 25**, **MONSKI, Jr. et al., 7,084,629** teaches and shows that "each of

Art Unit: 2831

said primary resonant substructures has said input resonant circuit corresponding thereto located in one of said short segment of said second ring thereof and said short segment of said first ring thereof.” **[See the correction certificate concerning the summary of the invention paragraphs of col. 6 line 43 through col. 7 line 50 and coll. 9 line 29 through col. 15 line 39, figures 2a, 2b, and 7-11]** The same reasons for rejection which apply to **claims 1, 8, 21, 22** also apply to **claims 11 and 25** and need not be reiterated.

With respect to neurovascular array corresponding **Claims 12, and 13** which respectively depend from **claims 1 and 8**, and corresponding volume coil **Claims 26, and 27** which respectively depend from **claims 21 and 22, MONSKI, Jr. et al., 7,084,629** teaches and shows that "each of said primary resonant substructures further includes at least one of: (a) a tuning circuit in at least one of said rods thereof; (b) a tuning circuit in said short segment thereof of said first ring; and (c) a tuning circuit in said short segment thereof of said second ring; for enabling said head coil to be tuned according to an offset tuning scheme through which each of said primary resonant substructures is (i) further decoupled from the other of said primary resonant substructures and (ii) still enabled to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signal.” **[See the correction certificate concerning the summary of the invention paragraphs of col. 6 line 43 through col. 7 line 50 and coll. 9 line 29 through col. 15 line 39, figures 2a, 2b, and 7-11]** The same reasons for rejection which apply to **claims 1, 8, 21, and 22**, also apply to corresponding **claims 12, 13; 26, and 27**; and need not be reiterated.

With respect to neurovascular array **Claim 14**, and corresponding volume coil **claim 29, MONSKI, Jr. et al., 7,084,629** teaches and shows that in the alternative examples birdcage coil **1000** of respectively **figures 3-7, 10-22** is used to uniform head/brain coverage in which “said second ring of said head coil” (i.e. **1102**) “has a diameter that is smaller than that of said first ring” (i.e. **1101**) **claim 29**) or “of said first ring of said head coil” (i.e. **claim 14**) **[See col. 9 line 29 through col. 15 line 39]**. The same reasons for rejection which apply to

Art Unit: 2831

claims 1, 21 also apply to **claims 14, 29** and need not be reiterated.

With respect to corresponding neurovascular array **Claims 15, 50** which depend from **claims 1 and 39** respectively, and corresponding volume coil **claims 33, 58** which depend from **claims 21 and 53** respectively, **MONSKI, Jr. et al., 7,084,629** shows that “said plurality of electrically-adjacent primary resonant substructures of said head coil is eight in number” [See figure 7), **MONSKI, Jr. et al.**, teaches that in the known prior arts which have parasitic current problems the rod structures “each being generally deployed 45 degrees apart from its neighbor”. [See **col. 11 line 16 through col. 14 line 2; col. 14 line 32-45.**] The same reasons for rejection which apply to **claims 1, 21, 39, 53** also apply to **claims 15, 33, 50, 58** and need not be reiterated.

With respect to corresponding neurovascular array **Claims 16, 50** and corresponding volume coil **claims 33, 59; MONSKI, Jr. et al., 7,084,629** teaches and shows that “(a) a first group of four of said primary resonant substructures have said rods thereof spaced approximately 60 degrees apart in each of said primary resonant substructures; and (b) a second group of four of said primary resonant substructures have said rods thereof spaced approximately 30 degrees apart in each of said primary resonant substructures; with said primary resonant substructures of said first and said second groups being deployed in alternating fashion”. [See figures 10, 11 col. 14 lines 2-31.] The same reasons for lack of novelty that apply to **claims 1, 15, 21, 33, 39, 50, 53, and 58** also apply to **claims 16, 34, 51, and 59** and need not be reiterated.

With respect to neurovascular array **Claim 17**, and corresponding volume coil **claim 35, MONSKI, Jr. et al., 7,084,629** teaches in one embodiment that that “said primary resonant substructures of said head coil (i.e. **claim 17**) or volume coil, (i.e. **claim 35**) are deployed generally symmetrically about the birdcage-like structure.” [See **col. 13 line 66 through col. 14 line 2.**] The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 15, 35** and need not be reiterated.

With respect to neurovascular array **Claim 18**, and corresponding volume

Art Unit: 2831

coil **claim 36, MONSKI, Jr. et al., 7,084,629** shows from figure 3 that “selected ones of said rods of said head coil are spaced at irregular distances from adjacent ones of said rods.” [See **col. 11 lines 17-37.**] The same reasons for rejection which apply to **claims 1, 21** also apply to **claims 18, 36** and need not be reiterated.

With respect to corresponding neurovascular array **Claim 19, 52 which depend from claims 1 and 39 respectively**; corresponding volume coil **claims 37, 60 which depend from claims 21 and 53 respectively**, and corresponding array coil **claim 67, MONSKI, Jr. et al., 7,084,629 teaches and** shows from figure 3 that “each of said rods includes a decoupling network therein for decoupling said head coil from a radio frequency transmit field of the MR system during a transmit cycle thereof. [See **col. 10 line 5 through col. 15 line 59, figures 2a, 2b, and 7-11**] The same reasons for rejection which apply to **claims 1, 21, 39, 53, and 61** also apply to **claims 19, 37, 52, 60, and 67** and need not be reiterated.

With respect to neurovascular array **Claim 20**, and corresponding volume coil **claim 38, MONSKI, Jr. et al., 7,084,629 teaches from the two different functions of the decoupling circuits that** “each of said decoupling networks includes an active decoupling circuit and a passive decoupling circuit” because high impedance shielding during transmission is an active decoupling and isolating flowing currents within the coil assembly generally is effectively passive decoupling. [See **col. 10 line 5 through col. 15 line 59, figures 2a, 2b, and 7-11.**] The same reasons for rejection which apply to **claims 1, 19, 21, 37** also apply to **claims 20, 38** and need not be reiterated.

With respect to volume coil **claim 28, MONSKI, Jr. et al., 7,084,629** shows from **figures 1a, 1b, 1c, 2a, 2b, 8, 9**, further including a combiner circuit for combining the magnetic resonance signal received by one of said primary resonant substructures with that received by at least one other of said primary resonant substructures and operatively coupling the magnetic resonance signals to one processing channel of the MR system.” [See **col. 9 lines 18-27**] The same

Art Unit: 2831

reasons for rejection which apply to **claims 21** also apply to **claim 28** and need not be reiterated.

With respect to volume coil **claim 29, MONSKI, Jr. et al., 7,084,629** teaches and shows that in the alternative examples birdcage coil "said second ring of said head coil" (i.e. **1000**) "has a diameter that is smaller than that of said first ring" [See **MONSKI, Jr. et al., 7,084,629** See **col. 9 line 29 through col. 15 line 39 and figures 3-7, 10-22**] The same reasons for rejection which apply to **claim 21** also apply to **claim 29** and need not be reiterated.

With respect to volume coil **claim 30, MONSKI, Jr. et al., 7,084,629** teaches and shows from **figures 3-7, 10-22** in combination that "each of said rods has a linear portion and a tapered portion with said linear portion being connected to said first ring and said tapered portion being connected to said second ring." [See **col. 9 line 18 through col. 10 line 4**] The same reasons for rejection which apply to **claims 21, 29** also apply to **claim 30** and need not be reiterated.

With respect to volume coil **claim 32, MONSKI, Jr. et al., 7,084,629** teaches that "said first and said second rings are one of circular and elliptical." [See **MONSKI, Jr. et al., 7,084,629 figures 3-7, 10-22** The same reasons for rejection which apply to **claims 21** also apply to **claim 33** and need not be reiterated.

With respect to neurovascular array **Claim 46**, corresponding volume coil **claim 54**, corresponding array **claim 64**, and the corresponding method **claim 69, MONSKI, Jr. et al., 7,084,629** teaches and shows that "said preamplifier decoupling scheme involves each of said primary resonant substructures having an input resonant circuit in said short segment of second ring thereof for enabling said primary resonant substructure via a low impedance preamplifier to be (i) operatively couplable to one processing channel of the MR system and (ii) decoupled thereat from the other of said primary resonant substructures. [**col. 10 line 49 through col. 15 line 59; figures 2a, 2b, and 8-11**] The same reasons for rejection which apply to **claims 39, 53, 61 and 68** also apply to **claims 46, 54, 64**

Art Unit: 2831

and 69 and need not be reiterated.

With respect to neurovascular array **Claim 47**, corresponding volume coil **claim 55**, and corresponding array **claim 65**, **MONSKI, Jr. et al., 7,084,629** teaches and shows that "said low impedance preamplifiers are provided as part of the neurovascular array" (i.e. **claim 47**) or the "volume coil" (i.e. **claim 55**), or the "array" (i.e. **claim 65**)." [See **col. 10 line 49 through col. 15 line 59; figures 2a, 2b, and 8-11**] The same reasons for rejection which apply to **claims 39, 46, 53, 54, 61, and 64** also apply to **claims 47, 55, and 65** and need not be reiterated.

With respect to neurovascular array **Claim 48**, and corresponding volume coil **claim 56**, **MONSKI, Jr. et al., 7,084,629** teaches and shows that "each of said low impedance preamplifiers is provided with one of the processing channels of the MR system." [See **col. 10 line 49 through col. 15 line 59; figures 2a, 2b, and 8-11**] The same reasons for rejection which apply to **claims 39, 46; 53, 54** also apply to **claims 48 and 56** and need not be reiterated.

With respect to neurovascular array **Claim 49**, corresponding volume coil **claim 57**, corresponding array **claim 66**, and the corresponding method **claim 70**, **MONSKI, Jr. et al., 7,084,629** and shows that "said offset tuning scheme involves in each of said primary resonant substructures **at least one of**: (a) a tuning circuit in at least one of said rods thereof; (b) a tuning circuit in said short segment thereof of said first ring; and (c) a tuning circuit in said short segment thereof of said second ring; for enabling each of said primary resonant substructures to be tuned so that signal current induced therein is effectively precluded from interfering with neighboring ones of said primary resonant substructures primarily via said first ring and said rods thereby enabling each of said primary resonant substructures (i) to be decoupled thereat from the other of said primary resonant substructures (ii) while maintaining the ability to resonate at an operating frequency of said head coil and thus to receive the magnetic resonance signal. ." [See **col. 9 line 18 through col. 15 line 59; figures 2a, 2b, and 7-11**] The same reasons for rejection which apply to **claims 39, 46; 53, 54;**

Art Unit: 2831

61, 64; and 68, 69 also apply to corresponding **claims 49, 57, 66 and 70** and need not be reiterated.

With respect to array **Claim 62, MONSKI, Jr. et al., 7,084,629** teaches and shows that “(a) said volume coil is intended for imaging of a head of a patient;” [See volume coil **1000**] “(b) said secondary coil is intended for imaging carotid structures on one side of a neck of the patient;” [See **Figures 2a through 22, col. 8 line 23 through col. 9 line 7; col. 15 lines 29 through col.16 line 29.**] “and (c) said tertiary coil is intended for imaging carotid structures on an other side of the neck of the patient” [See **Figures 2a through 22, col. 8 line 23 through col. 9 line 7; col. 15 lines 29 through col.16 line 29**]. The same reasons for lack of novelty that apply to **claims 53, 61** also apply to **claim 62** and need not be reiterated.

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

21. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Art Unit: 2831

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

22. **Claims 16, 34, 51, and 59 are rejected under 35 U.S.C. 103(a)** as being unpatentable over **Srinivasan** US patent 5,664,568 issued September 9th 1997.

With respect to corresponding neurovascular array **Claims 16, 50** and corresponding volume coil **claims 33, 59; Srinivasan '568** lacks directly teaching or showing that “(a) a first group of four of said primary resonant substructures have said rods thereof spaced approximately 60 degrees apart in each of said primary resonant substructures; and (b) a second group of four of said primary resonant substructures have said rods thereof spaced approximately 30 degrees apart in each of said primary resonant substructures; with said primary resonant substructures of said first and said second groups being deployed in alternating fashion”. However, **Srinivasan '568 does teach that other geometries, symmetries and configurations are possible, therefore the ability to interleave a 60 degree geometric symmetry with a 30 degree geometric symmetry, is an obvious variation of “alternate embodiments” which fall within the scope of the Srinivasan '568 teachings.** The same reasons for lack of novelty that apply to **claims 1, 15, 21, 33, 39, 50, 53, and 58** also apply to **claims 16, 34, 51, and 59** and need not be reiterated.

Prior Art of Record

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) Alradady et al., US patent application publication 2008/0275332 published November 6, 2008, which is the corresponding publication of applicant's instant application and is noted only for the purposes of a complete record.

Art Unit: 2831

- B) MONSKI, Jr. et al.**, US patent application publication 2005/0099179 published May 12, 2005 with an effective US priority date of November 27, 2002; which corresponds to the pre-grant publication application of the applied **MONSKI, Jr. et al., 7,084,629 patent. For the purposes of compact prosecution this reference has not been separately applied, however it is also relevant to all of the claims of applicants pending application**
- C) . Reisker et al.**, US patent 6,344,745 B1 issued February 5, 2002.

Conclusion

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday, Wednesday, and Friday-Thursday from 7:00am to 2:10 pm., and on Tuesday and Thursday from 7:00am to 5:30pm.

25. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Diego Gutierrez**, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

26. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/TAF/
April 15, 2010

/Brij Shrivastav/
Primary Patent Examiner
Technology Center 2800